

## CLAIMS

What is claimed is:

1. A base station controller system communicatively coupled to a core network, said base station control system comprising:

5 a plurality of resource pools to support wireless communication with a plurality of wireless access terminals, each said resource pool performing a defined call processing function;

a switching fabric to provide redundant and independent access to each of said resource pools such that resources from each said resource pool are

10 independently selectable from resources in other said resource pools by configuring said switching fabric; and

a system controller to configure said switching fabric to selectively allocate resources from said resource pools to communicatively connect said wireless access terminals with the core network.

15 2. The base station controller system of claim 1 wherein said switching fabric comprises a distributed ATM switching fabric.

3. The base station controller system of claim 1 wherein said distributed ATM

20 switching fabric comprises:

a centralized ATM switching resource communicatively coupled to said system controller and at least one distributed ATM switching resource;

said at least one distributed ATM switching resource providing redundant communication links between said resource pools and said centralized

25 ATM switching resource.

4. The base station controller system of claim 1 wherein said resource pools comprise front haul exchange termination resources to communicatively couple with a mobile switching center in the core network.

5 5. The base station controller system of claim 1 wherein said resource pools comprise service option element resources to provide vocoding and echo cancellation functions for voice calls.

6. The base station controller system of claim 1 wherein said resource pools  
10 comprise selector element resources to provide radio link management and protocol support for voice, data, and packet data calls.

7. The base station controller system of claim 1 wherein said resource pools  
comprise packet network exchange termination resources to communicatively couple  
15 with a packet data serving node in the core network.

8. The base station controller system of claim 1 wherein said resource pools  
comprise back haul exchange termination resources to communicatively couple with at  
least one radio base station providing RF communication to support calls to and from  
20 said plurality of said wireless access terminals.

9. A base station controller system comprising:

a plurality of resource pools, each said resource pool comprising resources

supporting at least one call processing function; and

a system controller to allocate selected combinations of specific resources from

5 one or more of said plurality of resource pools to provide desired call

processing for respective ones of calls to and from a plurality of wireless

access terminals;

said base station controller organized as:

a hub subrack comprising a central switching resource and said system

10 controller; and

at least one processing subrack to carry said plurality of resource pools,

each said processing subrack comprising resources from each of

said plurality of resource pools, and further comprising switching

resources to communicatively couple said processing subrack to

15 said hub subrack.

10. The base station controller system of claim 9 wherein said switching resources

on each said processing subrack and said central switching resource on said hub

subrack together comprise a switching fabric to communicatively couple said hub

20 subrack with each of said processing subracks.

11. The base station controller system of claim 10 wherein said switching fabric comprises:

a communication switch on said hub subrack;

a communication switch on each said processing subrack; and

5 a plurality of communication links between said communication switches on said processing subracks and said communication switch on said hub subrack.

12. The base station controller system of claim 11 wherein said communication links  
10 between each said processing subrack and said hub subrack comprise redundant first and second communication links.

13. The base station controller system of claim 12 wherein each said communication  
switch on said hub subrack and each said processing subrack comprises redundant  
15 primary and secondary communication switches for switching said first and second communication links, respectively.

14. The base station controller system of claim 13 wherein said switching fabric  
comprises a primary switching fabric and a redundant secondary switching fabric, said  
20 primary switching fabric comprising said first communication links and said first communication switches, and said secondary switching fabric comprising said second communication links and said second communication switches.

15. The base station controller system of claim 11 wherein said communication  
25 switches on said hub subrack and each said processing subrack comprise one of a set of ATM switches, Ethernet switches, or Internet Protocol (IP) switches.

16. The base station controller system of claim 9 wherein each said mixed-  
architecture processing subrack comprises a percentage of an overall call processing  
capacity of said base station controller system, and further wherein the overall call  
5 processing capacity of said base station controller system may be scaled based on  
adding additional ones of said processing subracks.

17. The base station controller system of claim 9 wherein said system controller  
comprises at least one general processing board operative to configure said central  
10 switching resource on said hub subrack and said switching resources on at least one of  
said processing subracks to select combinations of specific resources from one or more  
of said plurality of resource pools for each call routed through said base station  
controller.

18. The base station controller system of claim 17 wherein said system controller  
comprises a processing subsystem configured to optimize resource selections such that  
15 resource assignments comprising said selected combinations of resources from said  
one or more of said plurality of resource pools are selected from a minimum number of  
said processing sub racks.

19. The base station controller system of claim 9 wherein said plurality of resource pools comprise:

front haul exchange termination resources to provide a plurality of front haul communication links with an associated mobile switching center, each said front haul communication link carrying call traffic for at least one call between said base station controller system and the associated mobile switching center;

back haul exchange termination resources to provide a plurality of back haul communication links with at least one radio base station, each said back haul communication link carrying call traffic for at least one call between said base station controller system and at least one radio base station in wireless communication with at least one wireless access terminal involved in said at least one call;

selector element resources to provide radio link management for calls being routed through said base station controller; and

service option element resources to provide selected signal processing functions, including voice coding and decoding and echo cancellation functions for calls being routed through said base station controller.

20. The base station controller system of claim 9 wherein said resource pools further comprise packet core network exchange termination resources to route packet data calls to and from one or more of the plurality of wireless access terminals to an external packet data network.

21. A method of structuring a base station controller system wherein call processing for each call being routed through the base station controller comprises performing a plurality of call processing functions, the method comprising:

providing a plurality of resource pools, each one of said resource pools providing

one of the plurality of call processing functions;

interconnecting said plurality of resource pools through a configurable switching

fabric such that each said resource pool is independently accessible; and

allocating a specific combination of resources selected from one or more

resource pools in said plurality of resource pools to each call being routed

through said base station controller by configuring said switching fabric.

22. The method of claim 21 further comprising organizing the base station controller system as a rack system comprising:

a hub subrack providing centralized switching resources; and

one or more processing subracks, each said processing subrack carrying at least

a portion of each said resource pool and rack switching resources to

interface with said hub subrack.

23. The method of claim 22 further comprising increasing a call processing capacity of the base station controller system based on adding additional ones of said processing subracks as needed.

24. The method of claim 22 further comprising optimizing resource assignments for a given call being routed through the base station controller system by assigning specific

resources from one or more said resource pools to minimize the number of said processing subracks used to support the given call.